LEON CHARLES THEVENIN: He was an engineer with France's Postes, Telegraphe et Telephone. In 1883, he published (twice!) a proof of what is now called the Thevenin equivalent while developing ways of teaching electrical engineering concepts at the Ecole Polytechnique. He did not realize that the same result had been published by Hermann Helmholtz, the renowned nineteenth century physicist, thiry years earlier.

HANS FERDINAND MAYER: After earning his doctorate in physics in 1920, he turned to communications engineering when he joined Siemens & Halske in 1922. In 1926, he published in a German technical journal the Mayer-Norton equivalent. During his interesting career, he rose to lead Siemen's Central Laboratory in 1936, surruptiously leaked to the British all he knew of German warfare capabilities a month after the Nazis invaded Poland, was arrested by the Gestapo in 1943 for listening to BBC radio broadcasts, spent two years in Nazi concentration camps, and went to the United States for four years working for the Air Force and Cornell University before returning to Siemens in 1950. He rose to a position on Siemen's Board of Directors before retiring.

EDWARD L. NORTON: Edward Norton was an electrical engineer who worked at Bell Laboratory from its inception in 1922. In the **same** month when Mayer's paper appeared, Norton wrote in an internal technical memorandum a paragraph describing the current-source equivalent. No evidence suggests Norton knew of Mayer's publication.

3.8 Circuits with Capacitors and Inductors

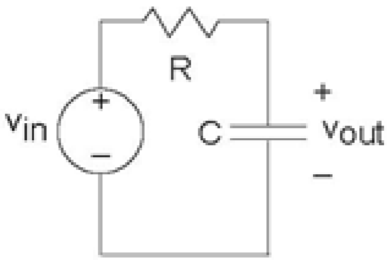

Figure 3.22 A simple RC circuit.

Let's consider a circuit having something other than resistors and sources. Because of KVL, we know that $v_{in} = v_R + v_{out}$. The current through the capacitor is given by

$$i = C\frac{d}{dt}(v_{out})$$

, and this current equals that passing through the resistor. Substituting ***vR = Ri*** into the KVL equation and using the v-i relation for the capacitor, we arrive at

$$RC\frac{d}{dt}(v_{out}) + v_{out} = v_{in}$$

The input-output relation for circuits involving energy storage elements takes the form of an ordinary differential equation, which we must solve to determine what the output voltage is for a given input. In contrast to resistive circuits, where we obtain an **explicit** input-output relation, we now have an **implicit** relation that requires more work to obtain answers.